LN Series Free Programmable LN-PRGxxx-12 Controllers

Installation Instructions

LN-PRG203-12, LN-PRG300-12,
LN-PRG4x0-12, LN-PRG6x0-12

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Refer to the QuickLIT Web site for the most up-to-date version of this document.

Applications

The LN Series Free Programmable LN-PRGxxx-12 Controllers are microprocessor-based and designed to control various building automation systems, such as multi-zone air handing units, lighting control, central plant applications, and power measurement applications.

The LN Free Programmable Controllers are built on a similar platform, but have different numbers of inputs and outputs. The LN PRG6x0-12 controllers are compatible with the LN Input/Output (I/O) Extension Module 400 Series models. For more information on LN I/O Extension Modules, refer to *LN Series Input/ Output (I/O) Extension Modules Installation Instructions (LIT-12011693)*.

The LN Free Programmable Controllers use the LONWORKS® communication protocol.

Follow these recommendations for proper installation and subsequent operation of each controller:

- Inspect the controller for shipping damages. Do not install damaged controllers.
- Keep the controller at room temperature for at least 24 hours prior to installation to allow any condensation that may have accumulated during shipping to evaporate.
- If the controller is used in a manner not specified by Johnson Controls, the functionality and the protection provided by the controller may become impaired.
- Record the 12-digit Neuron® ID located on either end of the device (shown on the sticker below the barcode) for commissioning.

  Note: The controller's plastic enclosure has a back plate that is separate from the front plate allowing the back plates to be shipped directly to the installation site while all the engineering is done elsewhere.

IMPORTANT: Prevent any static electric discharge to the controller. Static discharge can damage the controller and void the warranties.

North American Emissions Compliance

Canada

Industry Canada Statement

The term **IC** before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Le terme « **IC** » précédant le numéro d'accréditation/ inscription signifie simplement que le produit est conforme aux spécifications techniques d'Industry Canada.

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Installation

Observe these guidelines when installing an LN Free Programmable Controller:

- Transport the controller in the original container to minimize vibration and shock damage.
- Verify that all parts shipped with the controller.
- Do not drop the controller or subject it to physical shock.

Johnson Controls

Dimensions

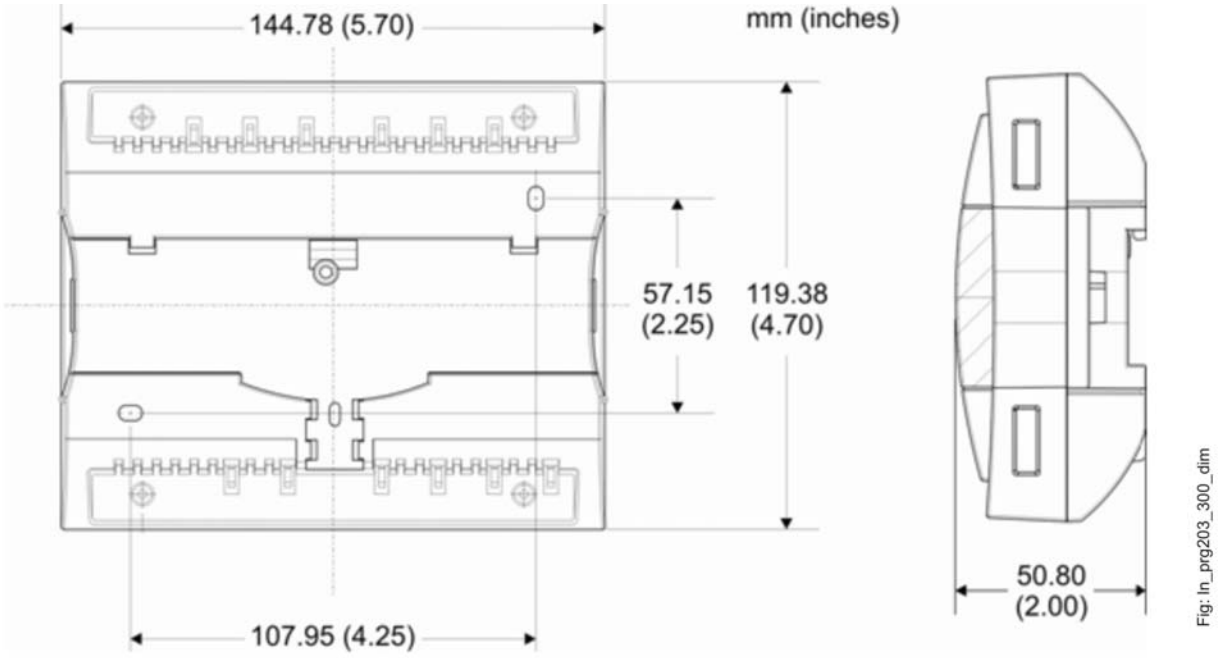

Figure 1: LN-PRG203-12 and LN-PRG300-12 Controller Dimensions, mm (in.)

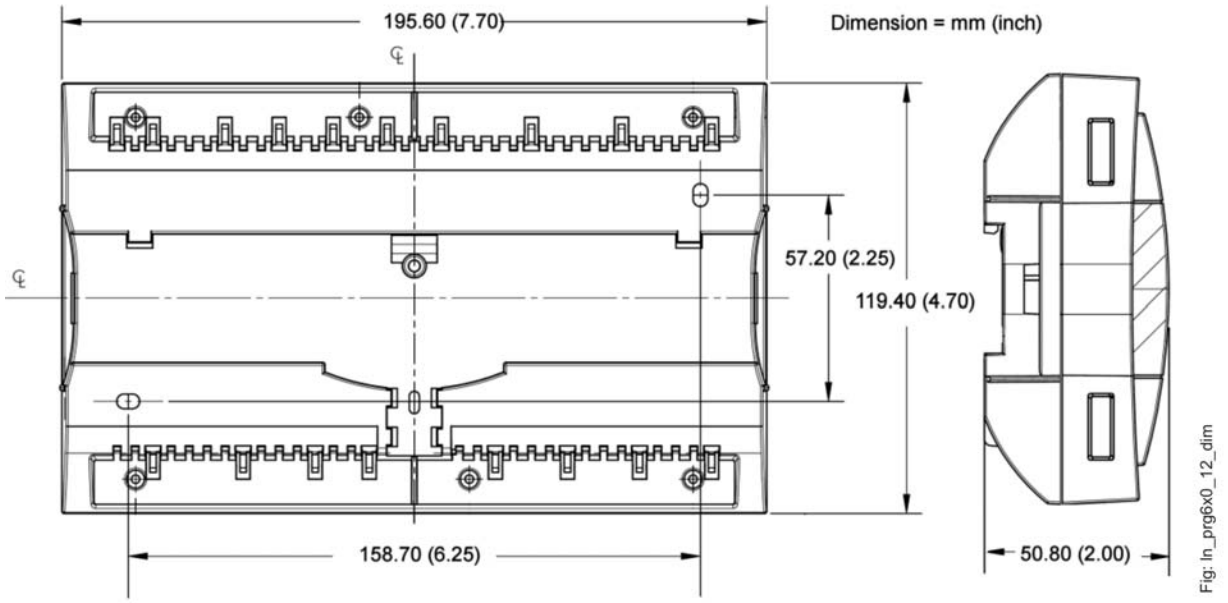

Figure 2: LN-PRG4x0-12 and LN-PRG6x0-12 Controller Dimensions, mm (in.)

Mounting

Location Considerations

Observe these guidelines when mounting an LN Free Programmable Controller:

- Allow for proper clearance around the controller's enclosure, wiring terminals, and service pin to provide easy access for hardware configuration and maintenance.
- Ensure proper ventilation of each controller and avoid areas where corroding, deteriorating, or explosive vapors, fumes, or gases may be present.
- Orient each controller with the ventilation slots and power supply/output terminal block connector towards the top to permit proper heat dissipation.
- Do not mount the controller on surfaces prone to vibration, such as duct work, or in areas where electromagnetic emissions from other devices or wiring can interfere with controller communication.

You can mount each controller on a DIN rail, on a wall, or in a panel. The controllers are equipped with two mounting holes 0.25 x 0.165 in. (6.35 x 4.191 mm).

DIN Rail

To mount the controller on a DIN rail:

1. Ensure the DIN rail is properly mounted on the wall.
2. Clip the controller onto the DIN rail.

Wall Mount

To mount the controller on a wall:

1. Press on the side clips to separate the controller's front and back plates.
2. Use the holes on the back plate to mark the wall location.
3. Drill the holes.

Clean the surface and mount the controller using the appropriate screws.

Wiring

CAUTION: Risk of Electric Shock.
Disconnect the power supply before making electrical connections to avoid electric shock.

MISE EN GARDE : Risque de décharge électrique.
Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

Follow these wiring recommendations:

- Remove the front plate from the back plate to facilitate in the wiring process. Use a small flat screwdriver to tighten the terminal connector screws once the wires are inserted.
- Keep power cables apart from other types of wiring to avoid ambient noise transmission to other wires (for example, for power, 3-wire voltage, and current inputs and outputs).
- Use wires or flat cables ranging from 22 to 14 AWG (0.644 to 1.630 mm diameter) per pole. Power cables must remain between 18 to 14 AWG (1.024 to 1.630 mm) diameter.
- Do not connect the universal inputs, analog/digital outputs or common terminals to earth or chassis ground unless otherwise stated.
- Keep all wires away from high speed data transmission cables (for example, Ethernet cable).
- Keep input and output wires in conduits, trays, or close to the building frame whenever possible.

Power Wiring

IMPORTANT: Voltage: 24 VAC/DC; ±15%, Class 2. This is a Class 2 Product. Use a Class 2 transformer only (rated at 100 VA or less at 24 VAC) to power the controller.

We recommend wiring only one controller per 24 VAC transformer. When only one transformer is available, determine the maximum number of controllers that can be supplied using the following method for calculating the required power transformer capacity:

1. Add up the maximum power consumption of all controllers, including external loads, and multiply this sum by 1.3.
2. If the resulting number is higher than 100 VA, use multiple transformers.

Use an external fuse on the 24 VAC/DC side (secondary side) of the transformer to protect all controllers against power link spikes (Figure 3 and Figure 4).

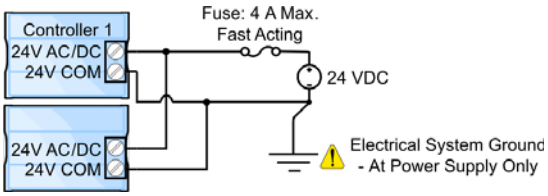

Figure 3: Power Wiring - DC

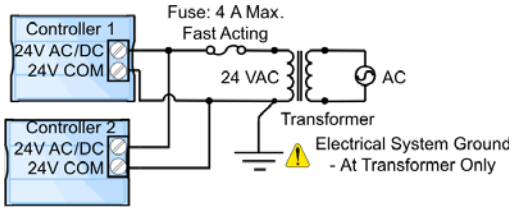

Figure 4: Power Wiring - AC

IMPORTANT: Maintain consistent polarity when you connect the controllers and devices to the transformer.

IMPORTANT: Connect the COM terminal of each controller and each peripheral to the same terminal on the secondary side of the transformer. One terminal on the secondary side of the transformer must be connected to the building's ground. Failure to maintain consistent polarity throughout the entire network will result in a short circuit and damage to the controller.

IMPORTANT: The COM terminals of the controller are internally wired to the 24 V COM terminal of the power supply. Connecting a peripheral or another controller to the same transformer without maintaining polarity between these devices will cause a short circuit.

Note: Connecting the power source to an electrical system ground is not a requirement for proper system operation. However, it is a good installation practice in order to maintain the same potential between all controllers and Protective Earth.

Configuration Jumper Location and Identification

Controllers have the following onsite configurable jumpers.

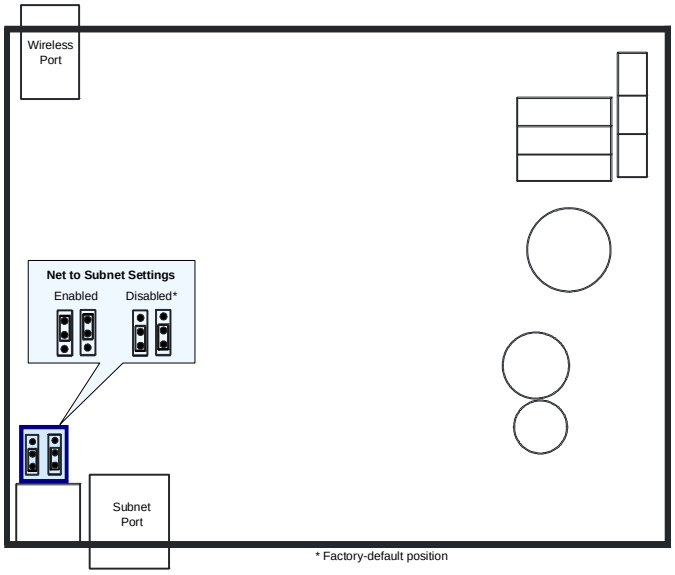

Figure 5: LN-PRG203-12 Controller Jumper Locations

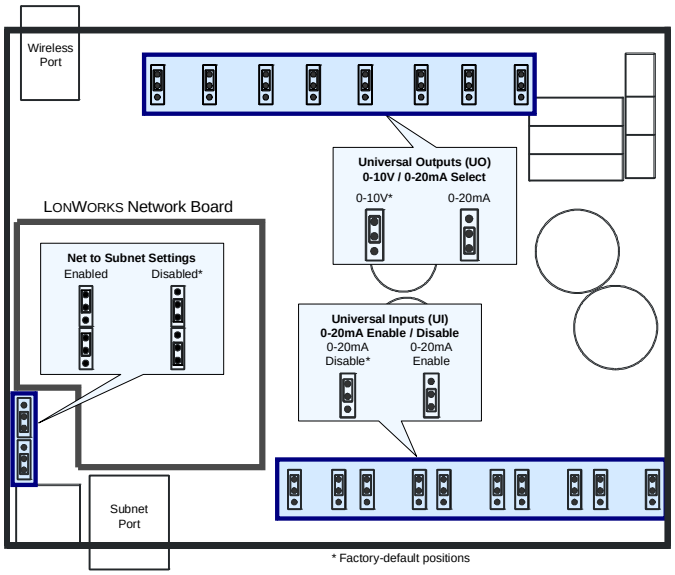

Figure 6: LN-PRG300-12 Controller Jumper Locations

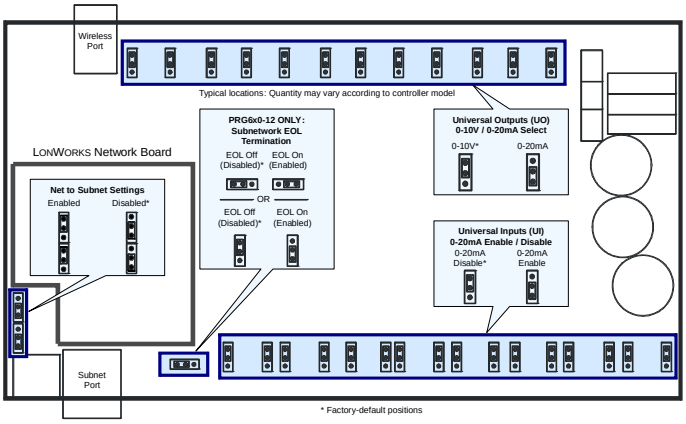

Figure 7: LN-PRG4x0-12 and 6x0-12 Controller Jumper Location

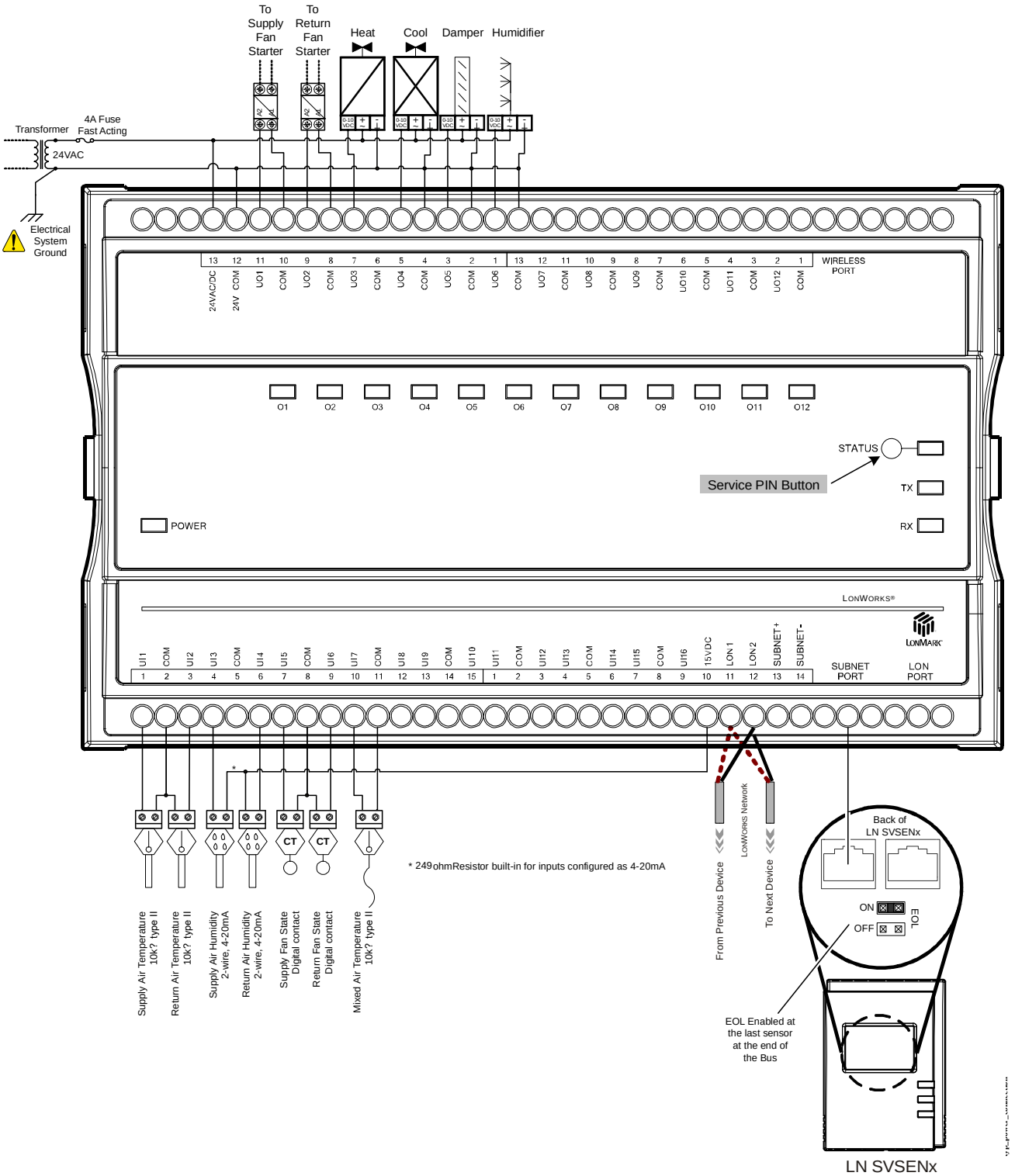

Figure 8: Typical Power and Network Connections with an LN-SVSENx-0 Input

Input Wiring

The controllers have physical connections for inputs, which are software configurable from within the device's Graphical Programming Interface (GPI) LN plug-in, the LN plug-in when using LN Builder, or the LN wizard when using the BSC Workbench. Each input can be configured for digital, resistive, current, or voltage signals. You must configure the input types properly in the software plug-in or wizard to ensure proper input readings.

Table 1: Controller Input Support

Controller	Fast and Slow Pulse Inputs support		Current Input Jumper support: 0 to 10 VDC/0 to 20 mA
	50 Hz: 10 ms minimum ON/OFF (Fast Pulse)	1 Hz: 500 ms minimum ON/OFF (Slow Pulse)	
LN-PRG203-12	none	UI1 to UI6	none
LN-PRG300-12	UI1 to UI4	UI5 to UI10	yes; see Figure 16 and the section *Configuration Jumper Location and Identification*
LN-PRG4x0-12	UI1 to UI4	UI5 to UI12	
LN-PRG6x0-12	UI1 to UI4	UI5 to UI16	

IMPORTANT: Before connecting any input equipment to the controller, refer to the manufacturer's installation guide.

Note: For wire length less than 75 feet (23 m), use either a shielded or unshielded 18 AWG wire.

Note: For a wire up to 200 feet (61 m) long, a shielded 18 AWG wire is recommended.

Note: The wire should be shielded on the controller side and the shield length should be kept as short as possible.

Wiring Digital Inputs

Use this input configuration to monitor digital dry contacts, as well as pulsed contacts.

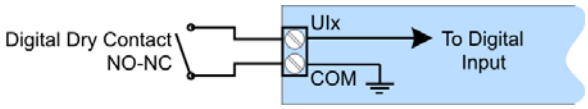

Figure 9: Digital Input – Digital Dry Contact (N.O. and N.C.)

Wiring Resistive Inputs

Use this input configuration to monitor Resistance Temperature Detectors (RTD); thermistors, such as 1,000 ohm RTDs to 10k ohm Type II and Type III thermistors; and potentiometers, such as 10k ohm and 100k ohm.

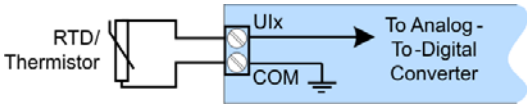

Figure 10: Resistive Input – RTD/Thermistor Input

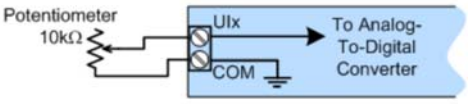

Figure 11: Resistive Input – 10k ohm Potentiometer Input

Wiring Current Inputs

Current inputs have a range of 0 to 20 mA. Depending on the transducer power requirements, you may use any of the following input configurations. Use Figure 12 for the 2-wire, 0 to 20 mA transducer powered by the controller's internal 15 VDC power supply.

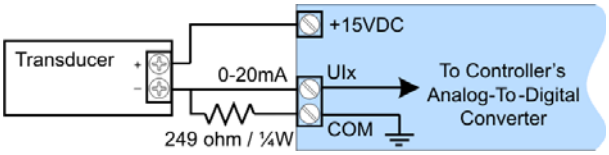

Figure 12: Current Input – 2-Wire Transducer Powered by the Controller

Use the Figure 13 configuration for a 2-wire, 0 to 20 mA transducer powered by an external 24 AC/DC power supply.

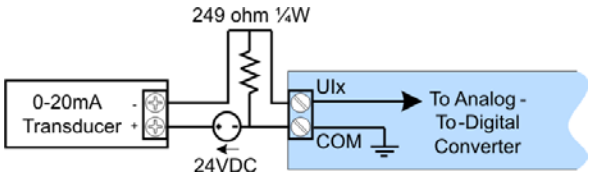

Figure 13: Current Input – 2-Wire Transducer, Externally Powered

Use the Figure 14 configuration for a 3-wire, 0 to 20 mA transducer powered by an external 24 AC/DC power supply.

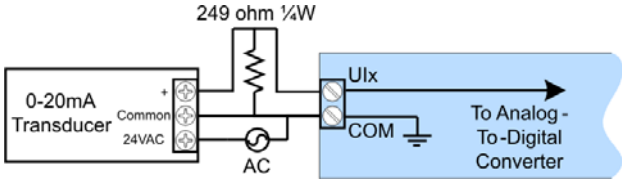

Figure 14: Current Input – 3-Wire Transducer, Externally Powered

Use the Figure 15 configuration for a transducer powered by its own power source.

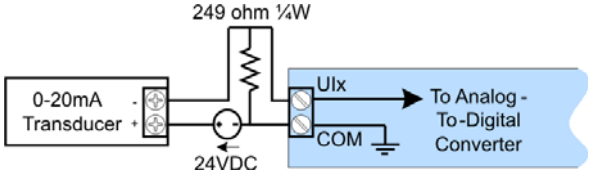

Figure 15: Current Input – Transducer with Its Own Power Source

For the LN-PRG300-12, LN-PRG4x0-12, and LN-PRG6x0-12 controllers, it is not necessary to connect a 249 ohm resistor at the input as this resistor is built-in to the controller. For these models, configure the input jumper as follows. For jumper location, see *Configuration Jumper Location and Identification*.

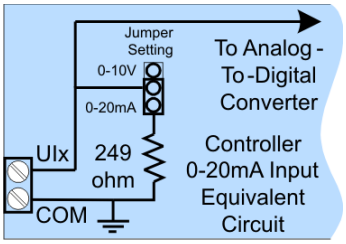

Figure 16: Equivalent Circuit for 0 to 20 mA Current Input Showing the Jumper Setting for the LN-PRG300-12, LN-PRG4x0-12, and LN-PRG6x0-12 Controllers

Wiring Voltage Inputs

Voltage inputs have a range of 0 to 10 VDC or 0 to 5 VDC. Connect the voltage input according to Figure 17 if you are using a 3-wire 0 to 10 V or 0 to 5 V transducer.

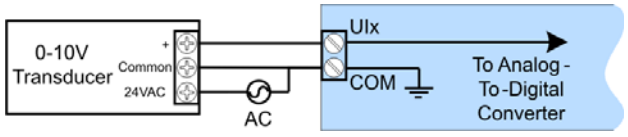

Figure 17: Voltage Input – 3-Wire Transducer

Connect the voltage input according to Figure 18 if the transducer is powered by its own power source.

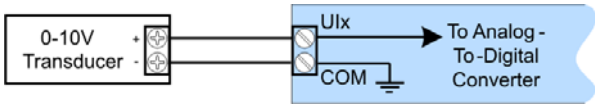

Figure 18: Voltage Input – Transducer with Its Own Power Source

Wiring Pulse Inputs

The input must be wired according to the requirements of the connected pulse meter (for example, fast pulse or slow pulse and internal or external supply type). See Table 1.

Configure the Pulse Input Types in the software to verify the pulse meter is powered correctly (set the Internal/External Supply Type).

Connect the pulse input according to Figure 19 for a pulse meter that can pull down a +5 VDC supply with a 10k ohm pull-up resistor (internal supply type).

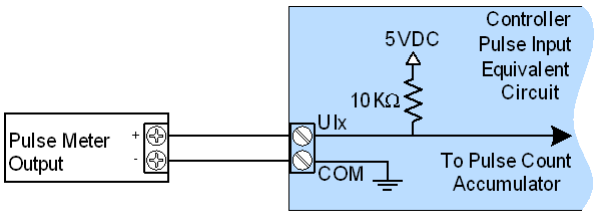

Figure 19: All Pulse Input Types – Internal Supply, 2-wire Pulse Meter

When you use a pulse meter that requires more than 5 VDC to operate, you must use a Fast Pulse Input type (Table 1). An external power supply is required to operate the pulse meter. You may use the controller's built-in power supply as shown in Figure 20 or use an external power source (from 6 VDC to 27 VDC maximum — see Figure 21).

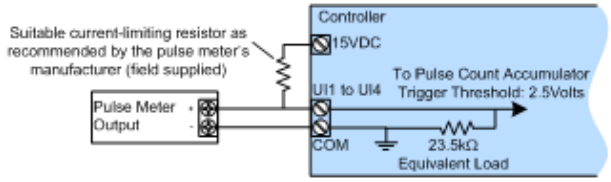

Figure 20: Fast Pulse Input Type - External Supply, 2-wire Pulse Meter for LN-PRG300, LN-PRG4x0-12, and LN-PRG6x0-12 Controllers

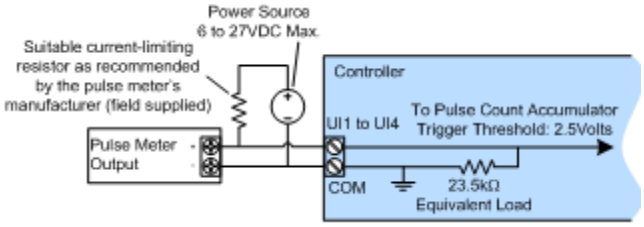

Figure 21: Fast Pulse Input Type – External Supply, 2-wire Pulse Meter

LN Series Communicating Sensors Wiring

The LN Communicating Sensors (LN-SVSEN-0 and LN-SVSENH-0) are communicating room temperature sensors with backlit displays and graphical menus.

Connect the LN-SVSENx-0 Sensor to the **SUBNET PORT** modular connector of the controller with a standard Category 5e Ethernet patch cable fitted with RJ-45 connectors.

If you make your own patch cable, use category 5e crimped with RJ-45 connectors either T568A or T568B.

IMPORTANT: Do not crimp one connector as T568A and the other connector as T568B on the same cable.

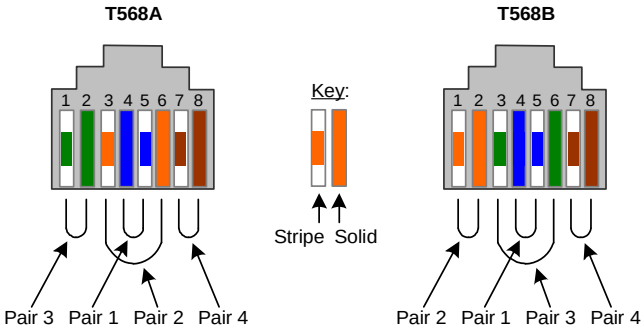

Figure 22: T568A and T568B Crimp Wire Sequence for an RJ-45 Connector

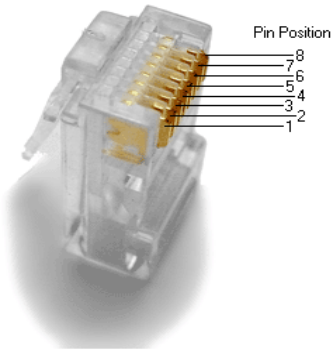

Figure 23: Pins on RJ-45 Jack Face

Patch cable fitted with connectors supplied by Johnson Controls are wired as T568B.

For more information on network topology and length, cable type, setting the Subnet ID and more, refer to the *LN Series Communicating Sensors Installation Instructions (LIT-12011795)* and the *LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*.

Output Wiring

Table 2: T568A and T568B Terminations for RJ-45 Connector

Pin	T568A (at both cable ends)		T568A (at both cable ends)	
	Pair	Color	Pair	Color
1	3	white/green stripe	2	white/orange stripe
2	3	green solid	2	orange solid
3	2	white/orange stripe	3	white/green stripe
4	1	blue solid	1	blue solid
5	1	white/blue stripe	1	white/blue stripe
6	2	orange solid	3	green solid
7	4	white/brown stripe	4	white/brown stripe
8	4	brown solid	4	brown solid

Each controller has physical connections for digital (triac) or universal outputs, depending on type and model. These outputs are all software configurable. Table 3 shows the controller outputs.

Table 3: Controller Output Support

Controller	Digital (Triac) Outputs	Universal Outputs	Jumper 0 to 10 VDC/0 to 20 mA
LN-PRG203-12	5	3	no
LN-PRG300-12	0	8	yes
LN-PRG4x0-12	0	12	yes
LN-PRG6x0-12	0	12	yes

For jumper location, see *Configuration Jumper Location and Identification*.

Note: Before you connect output equipment to the controller, refer to the installation instructions from the equipment manufacturer.

Output Wiring Recommendations

Output wiring recommendations include:

- For a wire length less than 75 feet (23 m) long, use either a shielded or unshielded 18 AWG wire.
- For a wire length up to 200 feet (61 m) long, use a shielded 18 AWG wire.
- The shield of the wire should be grounded on the controller side and the shield length should be kept as short as possible.

Wiring Digital Outputs (DOx)

Digital outputs are all made of triacs and there is not voltage present on the output terminals. Therefore, you must add an external power source, typically 24 VAC.

Note: To measure the state of a triac output, an external load must be connected.

If a 24 VAC relay is being controlled, connect it to a digital output according to Figure 24 or Figure 25, ensuring that the transformer's secondary wiring is grounded as shown.

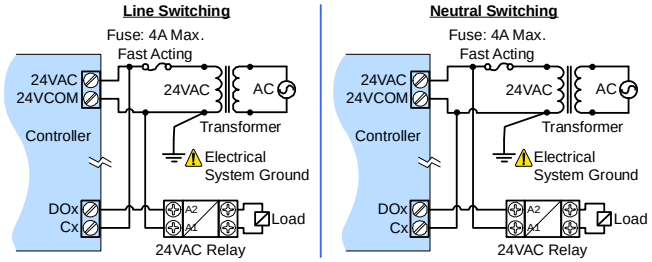

Figure 24: Digital Triac Output — Relay Using the Same Power Source as Controller

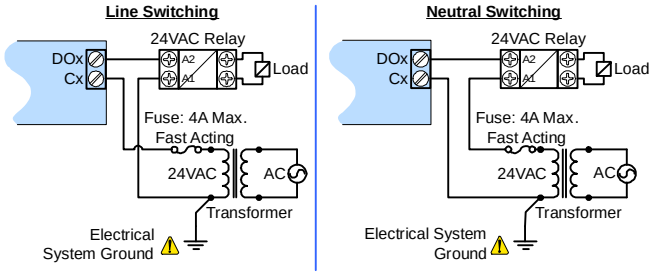

Figure 25: Digital Triac Output, Line Switching – Relay Using an External Power Source

If a floating actuator is being controlled, connect the digital output according to Figure 26.

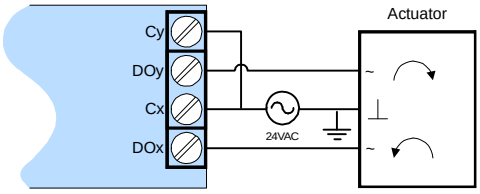

Figure 26: Digital Triac Output – Floating Actuator

Wiring Universal Outputs (UOx)

You can configure universal outputs to provide either a discrete signal of 0 or 12 VDC, a linear signal ranging from 0 to 10 VDC, or a 0 to 20 mA signal (LN-PRG300-12, LN-PRG4x0-12 and LN-PRG6x0-12 only). The discrete signal can be used to generate a pulse wave modulation (PWM) signal or a simple two-state signal. These outputs are protected by an auto-reset fuse.

Wiring Discrete Outputs

If a 12 VDC relay is being controlled, connect it to a universal output according to Figure 27.

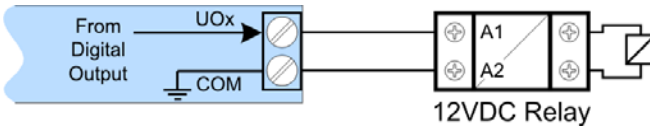

Figure 27: Discrete 0 or 12 VDC Universal Output – Relay

Wiring Current Outputs

The 0 to 20 mA signal is configurable by jumper (available for LN-PRG300-12, LN-PRG4x0-12, and LN-PRG6x0-12 only; for jumper location, see *Configuration Jumper Location and Identification*).

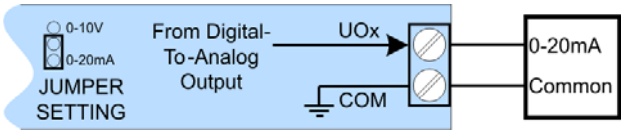

Figure 28: 0 to 20 mA Universal Output and Jumper Configuration

Voltage Outputs

Connect the 0 to 10 VDC as shown in Figure 29.

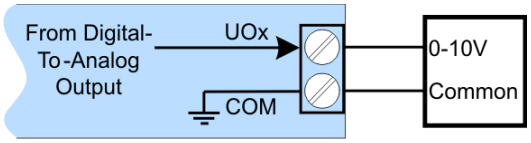

Figure 29: Voltage 0 to 10 VDC Universal Output

If you are controlling an analog actuator, connect the 0 to 10 VDC output, along with an external 24 VAC power source, to the analog actuator (Figure 30).

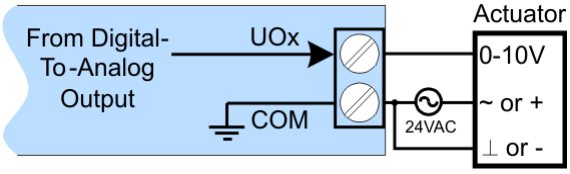

Figure 30: Voltage 0 to 10 VDC Universal Output - Analog Actuator

Communications Wiring

The recommended cable type for LONWORKS® communications is 22 AWG (0.65 mm), twisted pair, unshielded wire. The LONWORKS communication wire is polarity insensitive and can be laid out in a bus, star, or free topology. For loop topology, take special care to maintain the polarity when connecting the LONWORKS network to avoid a short circuit.

Note: We recommend you use the bus topology network configuration for all LONWORKS communication wiring. This configuration allows you to troubleshoot the network easily.

Connect both wires to the LON1 or LON2 terminals of the controller. When you insert multiple wires into the terminals, ensure you properly twist the wires together prior to inserting them into the terminal connectors.

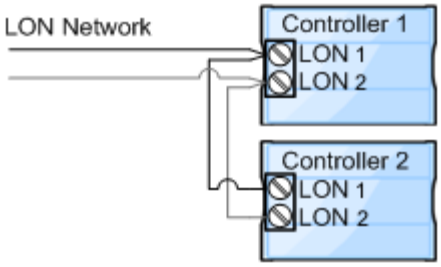

Figure 31: Communications Wiring

For information and detailed explanations on network topology and wire length restrictions, refer to the *LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*.

You can also refer to the Echelon® *Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks (Part No. 005-0023-01).*

IMPORTANT: Use the proper network terminators for the network topology. Failure to use the correct network terminators may result in communication errors between controllers. Do not use multiple gauges of cable on the same communication bus.

Selecting Network Terminators

Two network terminators are required for the bus topology network configuration. Place one network terminator at each end of the bus topology channel.

One network terminator is required for the free topology network configuration. You can put the network terminator anywhere on the channel.

When used with an LN Series Communicating Sensor, the network can be accessed at the sensor's audio plug port when the two **Net to Subnet Port Settings** jumpers inside the LN-PRG Series controller are set to **Enable** (for jumper location, see *Configuration Jumper Location and Identification*). This connects the main LONWORKS network to the LN-SVSENx-0 subnetwork Cat 5e cable to create a free topology LONWORKS network with maximum allowable total length of all segments combined to be no more than 1,600 feet (500 meters). The Cat 5e cable length may also be restricted by the maximum allowable subnetwork bus length.

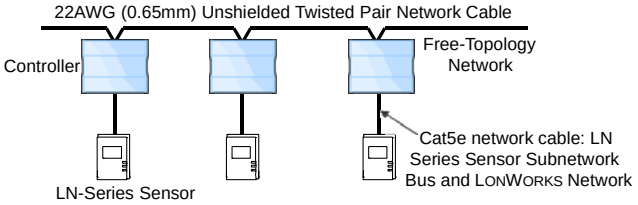
22AWG (0.65mm) Unshielded Twisted Pair Network Cable
Controller
Free-Topology Network
Cat5e network cable: LN Series Sensor Subnetwork Bus and LONWORKS Network
LN-Series Sensor

Figure 32: LONWORKS Network Free Topology

This setup mixes the cable gauge used for the network, which under rare conditions my cause communication problems. To help avoid these problems, carefully test for good communication on the entire network. If there are any network problems, see *Troubleshooting*.

Subnetwork Communications Wiring with the LN-PRG6x0-12 Controller

Supported Quantity of Sensors Per Controller

The LN-PRGxxx-12 controllers support between 4 and 12 LN Communicating Sensors. See Table 4 for the maximum allowable sensors per controller. You must set the Subnet ID of all sensors within the address range listed in Table 4.

Table 4: Number of LN Communicating Sensors Controller Models Support

Controller Series	Maximum Number of Sensors	Subnet ID Address Range
LN-PRG203-12	4	1–12
LN-PRG300-12	12	1–12
LN-PRG4x0-12	12	1–12
LN-PRG6x0-12	12	1–12

LN-IOE400 Series Extension Modules are connected to the **Subnet-** and **Subnet+** terminals of the LN-PRG6x0-12 Series controller.

For more information about network length, cable type, controller addressing, refer to the *LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*. Also, for information and requirements to implement the subnetwork for LN Input/Output (I/O) Extension Module 400 series models, refer to the *LN Series Input/Output (I/O) Extension Modules Installation Instructions (LIT-12011693)*.

Wireless Installation

The LN PRG Series controller can receive input signals from wireless devices when connected to a wireless receiver and programmed with GPI software. Compatible wireless devices include temperature sensors, duct sensors, window and door contacts, and light switches. These devices are easy to install, and can be mounted on a wide range of building materials.

For information on selecting mounting locations for the LN Series wireless option controllers, refer to the *LN Series Wireless Solution Guide Technical Bulletin (LIT-12011628)*.

Mounting the Wireless Receiver

There are three mounting options: on a wall or ceiling with double-sided tape, on a wall or ceiling with mounting screws, or on a metal enclosure using a 1/2-inch National Pipe Thread (NPT) hub.

Regardless of the mounting method, the wireless receiver should be 16 inches (41 cm) or more away from the controller or any other network cables.

Wall or Ceiling Mount with Double-Sided Tape

To mount on a wall using double-sided tape, first apply the tape to the back of the receiver and then stick the receiver onto the desired wall or ceiling location.

Wall or Ceiling Mount with Screws

To mount the wireless receiver with screws:

1. Separate the front and back plates on the receiver to open it.
2. Use the mounting holes on the back plate to mark the wall or ceiling location.
3. Drill the holes.
4. Clean the holes, insert wall anchors, and fasten the back plate with the screws.

Metal Enclosure Mount

To mount onto a metal enclosure:

1. Affix the 1/2 inch NPT hub to the bottom of the Wireless Receiver. Ensure the cap of the NPT hub is undone.
2. Place the Wireless Receiver onto the metal enclosure and align the NPT hub to the hole.
3. Use the cap to tighten the Wireless Receiver onto the enclosure.

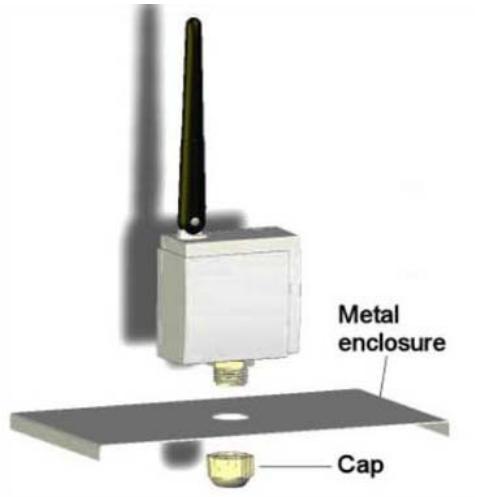

Figure 33: Metal Enclosure Mount

Connecting the Wireless Receiver

Connect the wireless receiver to the controller with the included telephone cable (4P4C modular connectors). Locate the telephone socket inside the device (Figure 34).

Figure 34: Telephone Socket Location

Connecting to the Controller Wireless Port

The wireless-option controllers have a wireless port where you connect the telephone cable. Locate the wireless port on the bottom of the controller.

Disconnecting the Wireless Port

To disconnect the plugged-in telephone cable from the controller's wireless port, pass a pointed object through the hole above the wireless port and press on the top of the connector while gently pulling out the cable.

Strain Relief and Terminal Block Cover

In certain jurisdictions, terminal block covers are required to meet local safety regulations. Strain reliefs and terminal block covers are available for controllers housed in large enclosures and are used to relieve tension on the wiring and conceal the controllers' wire terminals. Strain reliefs and terminal block covers are optional and are sold separately.

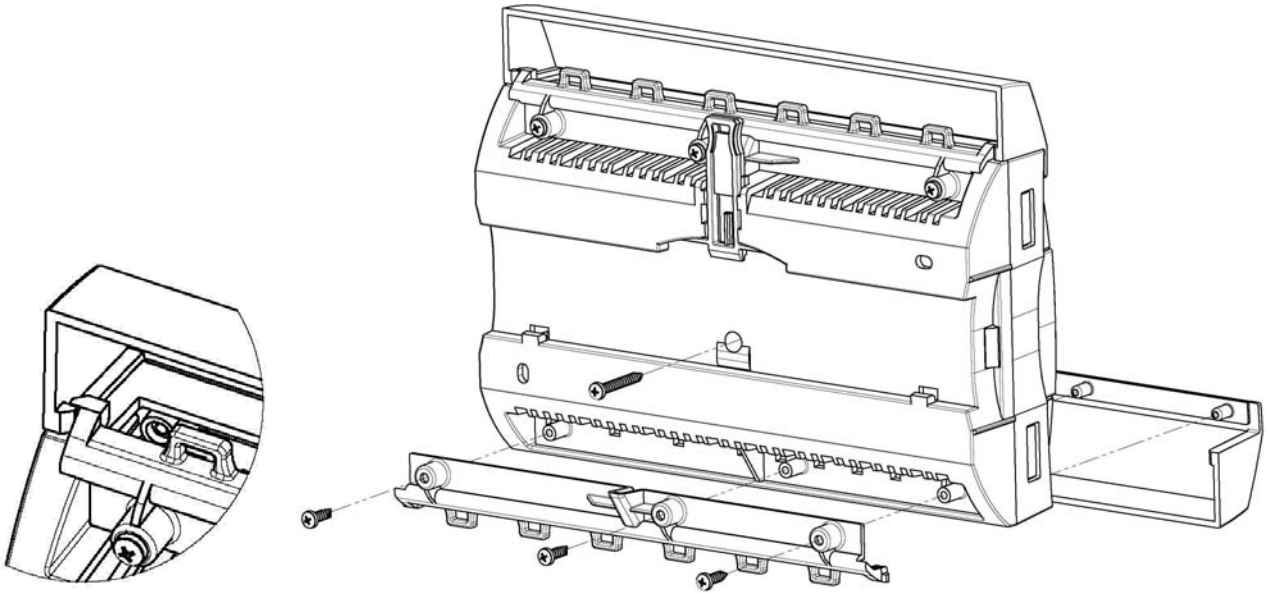

Figure 35: Large Enclosure Strain Relief and Terminal Block Cover Installation

Maintenance

CAUTION: Risk of Electric Shock.
Disconnect the power supply before making any electrical connections to avoid electric shock.

MISE EN GARDE : Risque de décharge électrique.
Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

Each controller requires minimal maintenance, but it is important to:

- clean the outside of the front plate and the inside of the back plate with a dry cloth.
- verify the tension of all wires and cables each time you service the controller.

Disposal

The Waste Electrical and Electronic Equipment (WEEE) Directive sets regulations for the recycling and disposal of products. The WEEE 2002/96/EG Directive applies to stand-alone products that can function on their own and are not a part of another system or piece of equipment. For this reason, Johnson Controls® products are exempt from the WEEE Directive. Nevertheless, they are marked with the WEEE symbol, indicating the devices are not disposed with municipal waste.

Dispose of products at the end of their useful life according to local regulations and the WEEE Directive.

Troubleshooting

Table 5 describes some troubleshooting scenarios.

Table 5: Troubleshooting (Part 1 of 3)

Problem	Solution
Controller is powered but does not turn on.	
Fuse Is Blown	Disconnect power from the controller and check the fuse integrity. Reconnect power.
Power Supply Polarity	Verify that consistent polarity is maintained between all controllers and the transformer. Ensure that the COM terminal of each controller is connected to the same terminal on the secondary side of the transformer. See Figure 4 and Figure 3.
Controller cannot communicate on the LONWORKS network.	
Absent or Incorrect Supply Voltage	1. Check power supply voltage between 24 VAC/DC ±15% and COM pins, and ensure that it is between acceptable limits. 2. Check for tripped fuse or circuit breaker.
Overloaded Power Transformer	Verify the transformer is powerful enough to supply all controllers.
Network Not Wired Properly	Check that the wire connections are correct.
Absent or Incorrect Network Termination	Check the network terminations.
Controller communicates well over a short network but does not communicate on large network.	
Network Length	Check that the total wire length does not exceed the specifications of the *Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks.*
Wire Type	Check that the wire type agrees with the specification of the LONWORKS *LN-Series Network Communications and Interface Guide* Technical Bulletin *(LIT-1201253)* or *Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks*.
Network Wiring Problem	Check that the wire connections are correct.
Absent or Incorrect Network Termination	Check the termination(s). Incorrect or broken termination(s) make the communication integrity dependent upon a controller's position on the network.
Extra Capacitance	Ensure no extra capacitance is connected to the network other than the standard FTT circuit, and a maximum of a 3 meter stub (in bus topology).
Number of Devices on Network Segment Exceeded	The number of controllers on a channel should never exceed 64. Use a router or a repeater in accordance with LONWORKS *LN-Series Network Communications and Interface Guide* Technical Bulletin *(LIT-1201253)* or *Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks*.

Table 5: Troubleshooting (Part 2 of 3)

Problem	Solution
Network Traffic	Query node statistic to check errors. Use a LONWORKS protocol analyzer to check network traffic.
I/O Extension Module cannot communicate on the subnetwork	
Absent or incorrect supply voltage	1. Check power supply voltage between 24 VAC ±15% and COM pins and ensure it is within acceptable limits. 2. Check for tripped fuse or circuit breaker.
Overloaded Power Transformer	Verify the transformer is powerful enough to supply all controllers.
Network Not Wired Properly	Check that the wire connections are correct.
Absent or Incorrect Network Termination	Check the network termination(s). Only the last LN-IOE4x0 must have the EOL termination set to ON. When one or more LN-SVSENx-0 sensors are connected to the controller, only the last LN-SVSENx-0 sensor must have its EOL termination set to ON. Refer to the *LN Series I/O Extension Modules Installation Instructions (LIT-12011693).*
There is another controller with the same Subnet ID on the subnetwork.	Each I/O Extension Module on the subnetwork must have a unique Subnet ID. Look at the Subnet ID DIP switch on the faceplate of each I/O Extension Module.
Network length	Check that the total wire length does not exceed the specifications of the *LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*.
Wire type	Check that the total wire type agrees with the specification of the *LONWORKS LN-Series Network Communication and Interface Guide Technical Bulletin (LIT-12011253)*.
Hardware input is not reading the correct value.	
Input Wiring Problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.
Open Circuit or Short Circuit	Using a voltmeter, check the voltage on the input terminal. A short circuit has a 0 V value and an open circuit has a 5 V value.
Configuration Problem	Check the configuration of the input using the controller configuration plug-in or wizard. Refer to the online help for more information.
Over Voltage or Over Current at an Input	An over voltage or over current at one input can affect the reading of other inputs. Observe the allowed voltage/current range limits for all inputs.
Hardware output is not operating correctly.	
Fuse has blown (auto reset fuse)	Disconnect the power and outputs terminals. Then wait a few seconds to allow the auto-reset fuse to cool down. Check the power supply and the output wiring if necessary.
Output Wiring Problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.
Configuration Problem	Using the controller configuration wizard (LN-GPI), check the configuration of the input. Refer to the controller's user guide for more information.
0 to 10 V Output, 24 VAC Powered Actuator is Not Moving	Check the polarity of the 24 VAC power supply connected to the actuator while connected to the controller. Reverse the 24 VAC wire if necessary.
Wireless devices not working correctly.	
Device not associated to controller	Using the device configuration wizard, check the configuration of the input.
Power discharge	Recharge the device with light (if solar powered) or replace the battery. Ensure sufficient light intensity (200lx for 4 hours per day)
Device too far from the Wireless Receiver	Reposition the device to be within the range of the Wireless Receiver. For information on typical transmission ranges, refer to the *LN Series Wireless Solution Technical Bulletin (LIT-12011628)*.
Configuration Problem	Check the configuration of the input using the device configuration plug-in or wizard.

Table 5: Troubleshooting (Part 3 of 3)

Problem	Solution
Rx/Tx LEDs	
Rx LED not Blinking	Data is not being received from the LONWORKS data bus.
Tx LED not Blinking	Data is not being transmitted onto the LONWORKS data bus.

Status LED Operation

Table 6: Status LED Operation Guide – Normal Operation

Operation	Service
One Fast Blink	Initialization: the device is starting up.
Fast Blink Continuous **(150 ms On, 150 ms Off, Continuous)**	Firmware upgrade in is progress and the controller operation is temporarily unavailable. The new firmware is being loaded into memory and the process takes a few seconds. Do not interrupt power to the device during this time.
The Status LED is Always OFF	The controller is operating normally.

Table 7: Status LED Operation Guide – Repeats every 2 seconds (highest priority first)

Operation	Service
Long blink continuous **(1s On, 1s Off, Continuous)**	The controller is not configured. Appropriate action: Commission the controller.
Long Long Long Blink **(800 ms On, 300 ms Off, 800 ms On, 300 ms Off, 800 ms Off)**	The controller is offline. Appropriate action: Set the controller online.
Long Short Short Short Blink	The controller is in bypass mode. Appropriate Action: Set the controller online
Short Short Long Blink	Poor-quality power; the device has browned-out: The voltage at the 24 VAC and 24 VCOM terminals has gone below the device's acceptable limit during powerup.
Fast Blink 12x	Wink: The wink function identifies a device.

For further information on the LN Series Communicating Sensors, refer to the *LN Series Communicating Sensors Installation Instructions (LIT-12011795)*.

For further information on the LN-IOE4x0 Series Extension Modules, refer to the *LN Series Input/Output (I/O) Extension Modules Installation Instructions (LIT-12011693).*

Repair Information

If the LN Series Controller fails to operate within its specifications, replace the unit. For a replacement controller, contact the nearest Johnson Controls® representative.

Technical Specifications

LN-PRG203-12 (Part 1 of 2)

Product Code	LN-PRG203-12
Power Requirements	**Voltage:** 24 VAC/DC; ±15%, 50/60 Hz, Class 2 **Protection:** 2.0A user-replaceable fuse **Power Consumption:** 14 VA typical plus all output loads **Maximum Consumption:** 23 VA
Environmental	**Operating Temperature:** 0 to 50°C, (32 to 122°F) **Storage Temperature:** -40 to 70°C, (-40 to 158°F) **Relative Humidity:** 0 to 90%
General	**Processor:** STM32 (ARM Cortex™ M3) MCU, 32 bit **Processor Speed:** 68 MHz **Memory:** 384kB Nonvolatile Flash (applications), 1 MB Nonvolatile Flash (storage) 64 kB RAM **Media Channel:** TP/FT-10; 78 Kbps **Communication:** LonTalk® protocol **Status Indicator:** Green LED - power status and LON TX, Orange LED - service and LON RX **Communication Jack:** LON® mono audio jack **LONMARK® Interoperability:** Version 3.4 **Device Class:** SCC Generic #8500 **LONMARK Functional Profile (pending):** Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Node Object: #0, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410, SCC Generic #8500
Enclosure	**Material:** ABS type PA-765A **Dimensions (with screws):** 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) **Shipping Weight:** 0.97 lb (0.44 kg)
Inputs	**Number of Inputs:** 6 **LN Series Communicating Sensors:** 4 **Input Types:** universal software configurable Voltage: 0 to 10 VDC (40k ohm input impedance) 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm external resistor (wired in parallel) Digital: dry contact Pulse: dry contact; 500 ms minimum On/Off **Resistor Support:** 0 to 350k ohms. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: Thermistor: Type 2 and Type 3 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) **Input Resolution:** 16-bit analog/digital converter **Power Supply Output:** 15 VDC; maximum 200 mA (6 inputs x 20 mA each)

LN-PRG203-12 (Part 2 of 2)

Outputs	**Digital (Triac) Outputs:** 5 **Universal Outputs:** 3 **Digital:** 24 VAC Triac, digital (on/off), floating, or PWM; software configurable 0.5 A continuous 1.0 A at 15% duty cycle for a 10-minute period PWM control: adjustable period from 2 seconds to 65 seconds Floating control: requires two consecutive outputs minimum plus on/off: 500 milliseconds adjustable drive time period External power supply **Universal:** Linear (0-10 VDC) Digital (on/off), PWM, or floating (0 to 12 VDC); software configurable; built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay. PWM control: adjustable period from 2 seconds to 65 seconds Floating control: minimum plus on/off: 500 ms adjustable drive time period 60 mA maximum at 12 VDC (60°C [140°F]) minimum resistance 200 ohms Auto reset fuse 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) **Output Resolution:** 10-bit digital/analog converter
Wireless Receiver[1]	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs**[2]**:** 24 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable: Connector:** 4P4C modular jack, Length: 6.5 ft (2 m)
Electromagnetic Compatibility	**CE Emission:** EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). **CE Immunity:** EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending). **FCC:** This device complies with FCC rules part 15, subpart B, class B (pending)
LN Series Communicating Sensor	**Communication:** RS-485 **Number of sensors per controller:** up to 4, in daisy-chain configuration **Cable:** Cat 5e, 8 conductor twisted pair **Connector:** RJ-45
Agency Compliance	**United States:** Under UL 916, Energy Management Equipment **Material**[3]**:** UL94-5VA
	Canada: Under UL 916, Energy Management Equipment **Material**[3]**:** UL94-5VA
CE	**Europe:** CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. Available when an optional external Wireless Receiver is connected to the controller. Some wireless inputs may use more than one wireless input from the controller.
2. Some wireless modules may use more than one wireless input from the controller.
3. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive.

LN-PRG300-12 (Part 1 of 2)

Product Code	LN-PRG300-12
Power Requirements	**Voltage:** 24 VAC/DC; ±15%, 50/60 Hz, Class 2 **Protection:** 3.0 A user-replaceable fuse **Power Consumption:** 16 VA typical plus all output loads **Maximum Consumption:** 38 VA
Environmental	**Operating Temperature:** 0 to 50°C, (32 to 122°F) **Storage Temperature:** -20 to 50°C, (-4 to 122°F) **Relative Humidity:** 0 to 90%
General	**Processor:** STM32 (ARM Cortex™ M3) MCU, 32 bit **Processor Speed:** 72 MHz **Memory:** 1 MB Nonvolatile Flash (applications), 2 MB Nonvolatile Flash (storage) 96 kB RAM **Media Channel:** TP/FT-10; 78 Kbps **Communication:** LonTalk® protocol **Transceiver:** FT 5000 Free Topology Smart Transceiver **Status Indicator:** Green LED - power status and LON TX, Orange LED - service and LON RX **Communication Jack:** LON® mono audio jack **LONMARK® Interoperability:** Version 3.4 **Device Class:** Static Programmable Device **LONMARK Functional Profile (pending):** Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Node Object: #0, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410
Enclosure	**Material:** FR/ABS **Dimensions (with screws):** 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) **Shipping Weight:** 0.97 lb (0.44 kg)
Inputs	**Number of Inputs:** 10 **LN Series Communicating Sensors:** 12 **Input Types:** universal software configurable Voltage: 0 to 10 VDC (40k ohm input impedance) 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm jumper configurable internal resistor Digital: dry contact Pulse: UI1 to UI4; 50 Hz maximum; Minimum 10 ms On/10 ms Off, SO output compatible; UI5 to UI10: 1 Hz maximum; Minimum 500 ms On/500 ms Off, dry contact **Resistor Support:** 0 to 350k ohms. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: Thermistor: Type 2 and Type 3 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) **Input Resolution:** 16-bit analog/digital converter **Power Supply Output:** 15 VDC; maximum 200 mA (10 inputs x 20 mA each)

LN-PRG300-12 (Part 2 of 2)

Outputs	**Universal Outputs:** 8 **Universal Output Characteristics:** 0-10 VDC linear; digital 0 to12 VDC (on/off), PWM, or floating (0 to 12 VDC) 0 to 20 mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay. PWM control: adjustable period from 2 to 65 sec **Floating control:** minimum plus on/off: 500 ms adjustable drive time period 60 mA maximum at 12 VDC (60°C; 140°F) **Load Resistance:** minimum resistance 200 ohms for 0 to 10 VDC and 0 to 12 VDC outputs, maximum 500 ohm for 0 to 20 mA output **Auto reset fuse** 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) **Output Resolution:** 10-bit digital/does analog converter
Wireless Receiver[1]	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs[2]:** 28 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable: Connector:** 4P4C modular jack, Length: 6.5 ft (2 m)
Electromagnetic Compatibility	**CE Emission:** EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). **CE Immunity:** EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending).
LN Series Communicating Sensor	**Communication:** RS-485 **Number of sensors per controller:** up to 12, in daisy-chain configuration **Cable:** Cat 5e, 8 conductor twisted pair **Connector:** RJ-45
Compliance:	
United States	UL Listed, File E107041, CCN PAZX7, Under UL 916, Energy Management Equipment
	FCC Compliant to CFR 47, Part 15, Subpart B, Class A
Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment
	Industry Canada, ICES-003
Europe CE	CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. Available when an optional external Wireless Receiver is connected to the controller. Some wireless inputs may use more than one wireless input from the controller.
2. Some wireless modules may use more than one wireless input from the controller.

LN-PRG4x0-12 Series (Part 1 of 2)

Product Code	LN-PRG400-12, LN-PRG410-12
Power Requirements	**Voltage:** 24 VAC/DC; ±15%, 50/60 Hz, Class 2 **Protection:** 3.0A user-replaceable fuse **Power Consumption:** 22 VA typical plus all output loads **Maximum Consumption:** 60 VA
Environmental	**Operating Temperature:** 0 to 50°C, (32 to 122°F) **Storage Temperature:** -20 to 50°C, (-4 to 122°F) **Relative Humidity:** 0 to 90%
General	**Processor:** STM32 (ARM Cortex™ M3) MCU, 32 bit **Processor Speed:** 72 MHz **Memory:** 1 MB Nonvolatile Flash (applications), 2 MB Nonvolatile Flash (storage) 96 kB RAM **Media Channel:** TP/FT-10; 78 Kbps **Communication:** LonTalk® protocol **Transceiver:** FT 5000 Free Topology Smart Transceiver **Status Indicator:** Green LED - power status and LON TX, Orange LED - service and LON RX **Communication Jack:** LON® mono audio jack **LONMARK® Interoperability:** Version 3.4 **Device Class:** Static Programmable Device **LONMARK Functional Profile:** Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Node Object: #0, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410
Enclosure	**Material:** FR/ABS **Dimensions (with screws):** 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) **Shipping Weight:** 0.97 lb (0.44 kg)
Inputs	**Number of Inputs:** 12 **LN Series Communicating Sensors:** 12 **Input Types:** universal software configurable Voltage: 0 to 10 VDC (40k ohm input impedance) 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm jumper configurable internal resistor Digital: dry contact Pulse: UI1 to UI4; 50 Hz maximum; Minimum 10 ms On/10 ms Off, SO output compatible; UI5 to UI12: 1 Hz maximum; Minimum 500 ms On/500 ms Off, dry contact **Resistor:** 0 to 350k ohms. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: Thermistor: Type 2 and Type 3 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) **Input Resolution:** 16-bit analog/digital converter **Power Supply Output:** 15 VDC; maximum 200 mA (16 inputs x 20 mA each)

LN-PRG4x0-12 Series (Part 2 of 2)

Outputs	**Universal Outputs:** 12 **Universal Output Characteristics:** 0-10 VDC linear; digital (on/off), PWM, or floating (0 to12 VDC) 0 to 20 mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay. **PWM control:** adjustable period from 2 to 65 seconds **Floating control:** minimum plus on/off: 500 ms adjustable drive time period 60 mA maximum at 12 VDC (60°C; 140°F) **Load Resistance:** minimum resistance 200 ohms for 0 to 10 VDC and 0 to 12 VDC, maximum 500 ohm for 0 to 20 mA output **Auto reset fuse** 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) **Output Resolution:** 10-bit digital/analog converter
Wireless Receiver[1]	**Communication:** EnOcean® Wireless standard **Number of Wireless Inputs**[2]**:** 28 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable: Connector:** 4P4C modular jack, Length: 6.5 ft (2 m)
Electromagnetic Compatibility	**CE Emission:** EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). **CE Immunity:** EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending). **FCC:** This device complies with FCC rules part 15, subpart B, class B (pending)
LN Series Communicating Sensor	**Communication:** RS-485 **Number of sensors per controller:** up to 12, in daisy-chain configuration **Cable:** Cat 5e, 8 conductor twisted pair **Connector:** RJ-45
Compliance:	
United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment
	FCC Compliant to CFR 47, Part 15, Subpart B, Class A
Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment
	Industry Canada, ICES-003
Europe CE	CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. Available when an optional external Wireless Receiver is connected to the controller. Some wireless inputs may use more than one wireless input from the controller.
2. Some wireless modules may use more than one wireless input from the controller.

LN-PRG6x0 Series (Part 1 of 3)

Product Code	LN-PRG600-12, LN-PRG610-12
Power Requirement	**Voltage:** 24 VAC/DC; ±15%, 50/60 Hz, Class 2 **Protection:** 3.0 A user-replaceable fuse **Power Consumption:** 22 VA typical plus all output loads **Maximum Consumption:** 65 VA

LN-PRG6x0 Series (Part 2 of 3)

Environmental	**Operating Temperature:** 0 to 50°C, (32 to 122°F) **Storage Temperature:** -20 to 50°C, (-4 to 122°F) **Relative Humidity:** 0 to 90%
General	**Processor:** STM32 (ARM Cortex™ M3) MCU, 32 bit **Processor Speed:** 72 MHz **Memory:** 1 MB Nonvolatile Flash (applications), 2 MB Nonvolatile Flash (storage) 96 kB RAM **Media Channel:** TP/FT-10; 78 Kbps **Communication:** LonTalk® protocol **Transceiver:** FT 5000 Free Topology Smart Transceiver **Status Indicator:** Green LED - power status and LAN TX, Orange LED - controller status and LAN RX **Communication Jack:** LON® mono audio jack **LONMARK® Interoperability:** Version 3.4 **Device Class:** Static Programmable Device **LONMARK Functional Profile:** Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Node Object: #0, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410
Enclosure	**Material:** FR/ABS **Dimensions (with screws):** 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) **Shipping Weight:** 1.17 lb (0.53 kg)
Inputs	**Number of Inputs:** 16 **LN Series Communicating Sensors:** 12 **Input Types:** universal software configurable Voltage: 0 to 10 VDC (40k ohm input impedance), 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm jumper configurable internal resistor Digital: dry contact Pulse: UI1 to UI4; 50 Hz maximum; Minimum 10 ms On/10 ms Off, SO output compatible; UI5 to UI16: 1 Hz maximum; Minimum 500 ms On/500 ms Off, dry contact **Resistor Support:** 0 to 350k ohms. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: Thermistor: Type 2 and Type 3 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) **Input Resolution:** 16-bit analog/digital converter **Power Supply Output:** 15 VDC; maximum 320 mA (16 inputs x 20 mA each)

LN-PRG6x0 Series (Part 3 of 3)

Outputs		**Number of Outputs:** 12 **Universal Output Characteristics:** 0-10 VDC linear; digital 0 to12 VDC (on/off), PWM, or floating (0 to 12 VDC), 0 to 20 mA (jumper configurable); software configurable Built-in snubbing diode to protect against back EMF, for example when used with a 12 VDC relay. PWM control: adjustable period from 2 to 65 seconds Floating control: minimum plus on/off: 500 ms, adjustable drive time period **HOA: Hand-Off-Auto-Switch (when equipped)** Hand position potentiometer range: 0-12.5 VDC 60 mA maximum at 12 VDC (60°C; 140°F) **Load Resistance:** minimum resistance 200 ohms for 0 to 10 VDC and 0 to 12.5 VDC, maximum 500 ohm for 0 to 20 mA output **Auto reset fuse** 60 mA at 60°C (140°F), 100 mA at 20°C (68°F) **Output Resolution:** 10-bit digital/does analog converter
Wireless Receiver[1]		**Communication:** EnOcean® Wireless standard **Number of Wireless Input**[2]**s:** 28 **Supported Wireless Receivers:** LN-WMOD315-0 and LN-WMOD868-0 **Telephone Cord Cable: Connector:** 4P4C modular jack, Length: 6.5 ft (2 m)
Electromagnetic Compatibility		**CE Emission:** EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). **CE Immunity:** EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending).
LN Series Communicating Sensor		**Communication:** RS-485 **Number of sensors per controller:** up to 12, in daisy-chain configuration **Cable:** Cat 5e, 8 conductor twisted pair **Connector:** RJ-45
I/O Extension Modules (LN-IOE 400 Series)		**Communication:** RS-485 **Number of I/O Extension Modules per controller:** up to 2, in daisy-chain configuration
Compliance	**United States**	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment
		Industry Canada, ICES-003
CE	**Europe**	CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. Available when an optional external Wireless Receiver is connected to the controller. Some wireless inputs may use more than one wireless input from the controller.
2. Some wireless modules may use more than one wireless input from the controller.

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls® office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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